

Revised sPHENIX MIE tracking specifications

Tony Frawley

Major constraints on the tracking system

DCA resolution < 100 μm for $p_T > 1 \text{ GeV}/c$

Mass resolution in $\Upsilon \rightarrow e^+e^-$ has to be no more than 100 MeV

- Requires p_T resolution $\sim 1.2\%$ for $p_T < 10 \text{ GeV}/c$

Small Bremsstrahlung tail on Υ peaks (i.e. low mass)

Good tracking efficiency in central Hijing events ($b=0-4 \text{ fm}$)

Good pattern recognition in central Hijing events

The “reference design” that we adopted for our revised MIE meets these requirements. The layout is shown in the next slide.

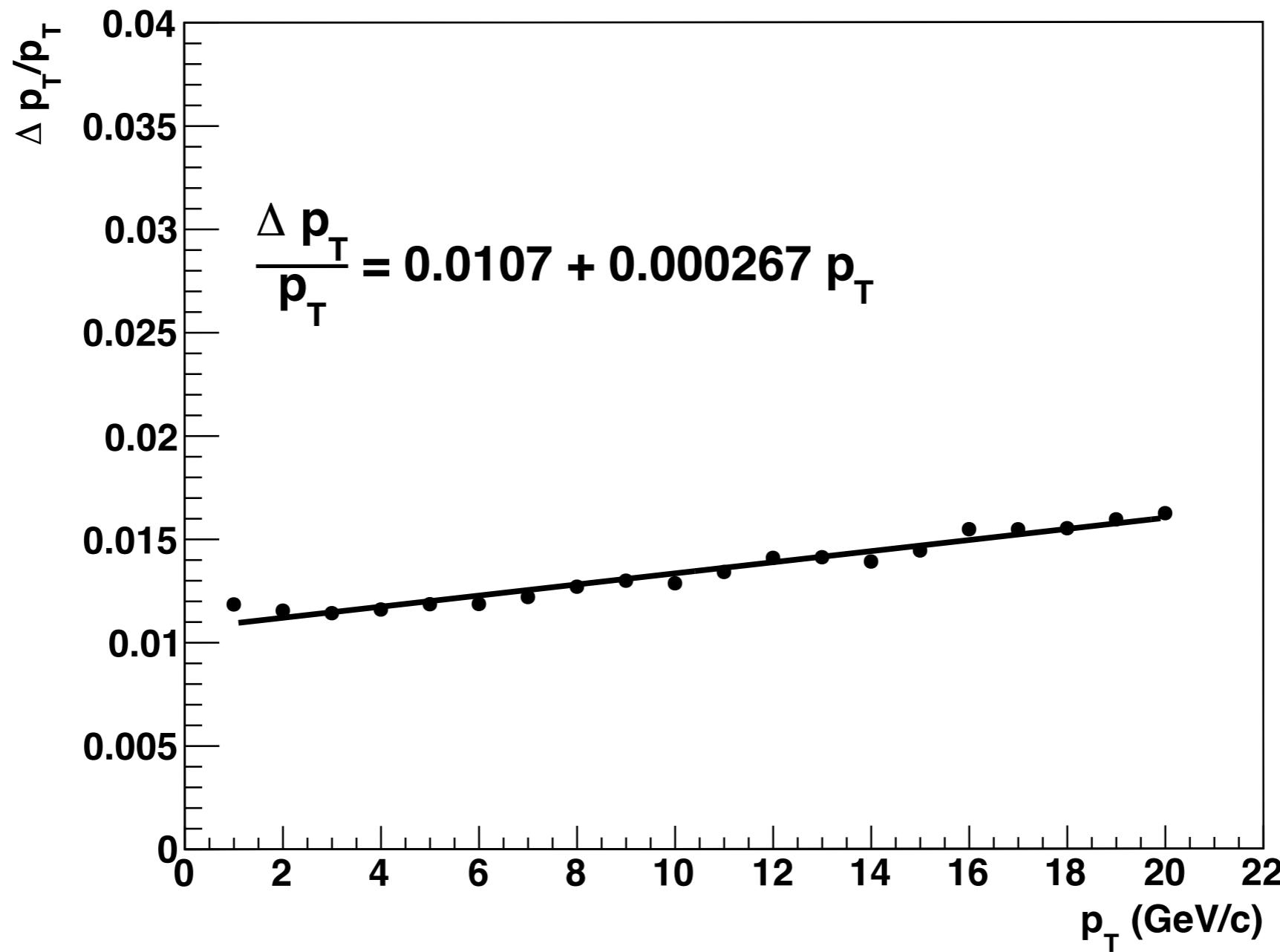
Some plots from simulations with the reference design are shown in the following few slides.

The reference design for revised MIE - 7 layer configuration

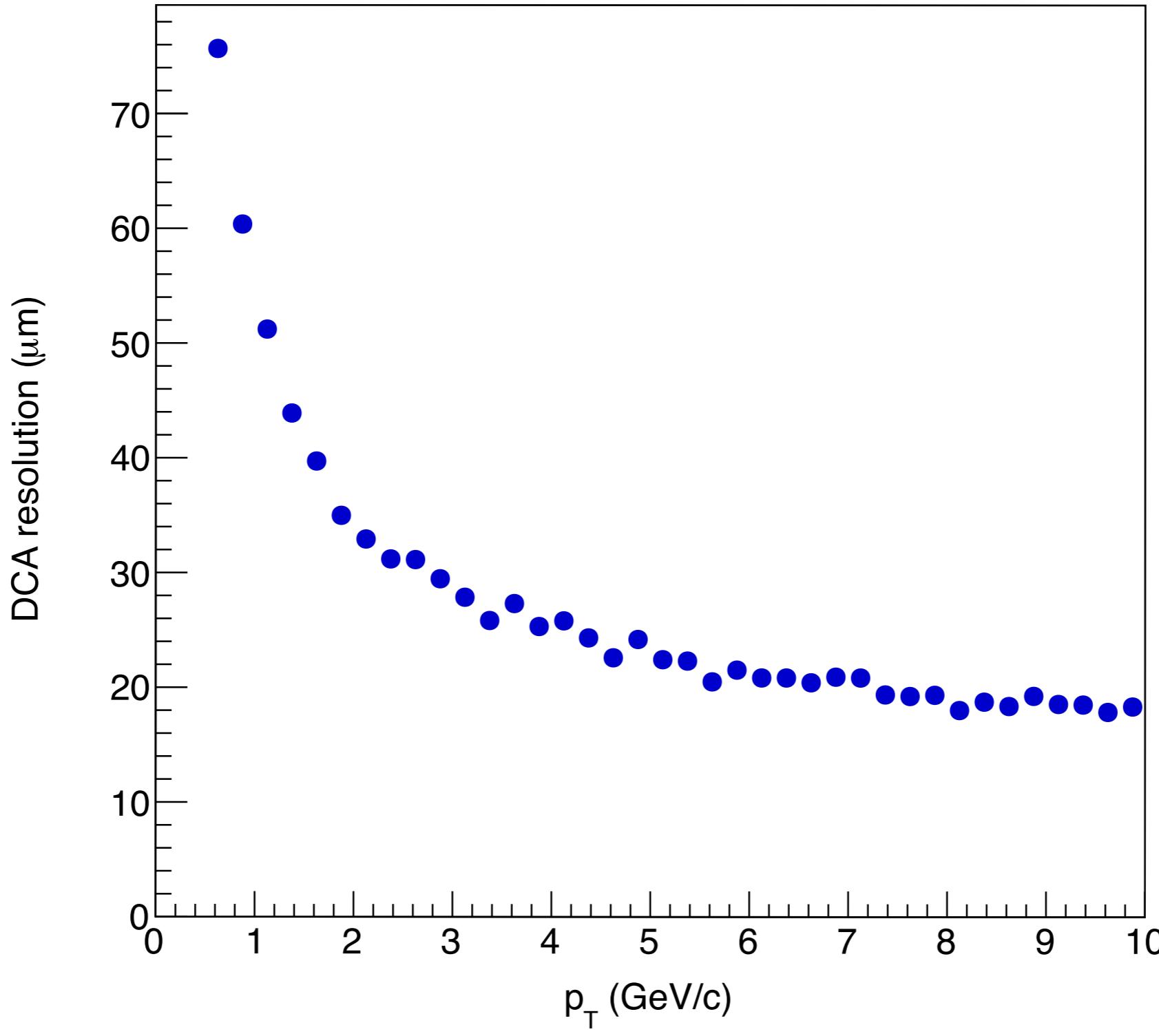
Layer	radius	Type	pixel/strip dimensions ($\mu\text{m} \times \text{mm}$)	X resolution (microns)	Z resolution (mm)	θ resolution (mrad)	Thickness (% X/ X_0)
B1	2.7	Pixel	50 x 0.425	15	0.12	4.8	1.3
B2	4.6	Pixel	50 x 0.425	15	0.12	2.4	1.3
S0a	9.5	strip	60 x 8	18	2.3	24.2	2.7
S0b	10.5	pattern recognition	240 x 2	70	0.58	5.5	
S1a	44.5	strip	60 x 8	18	2.3	5.5	2.0
S1b	45.5	pattern recognition	240 x 2	70	0.58	1.4	
S2	80	strip	60 x 8	18	2.3	3.1	2.0

where x is the pitch (bend) direction, y is the direction along the beam line.

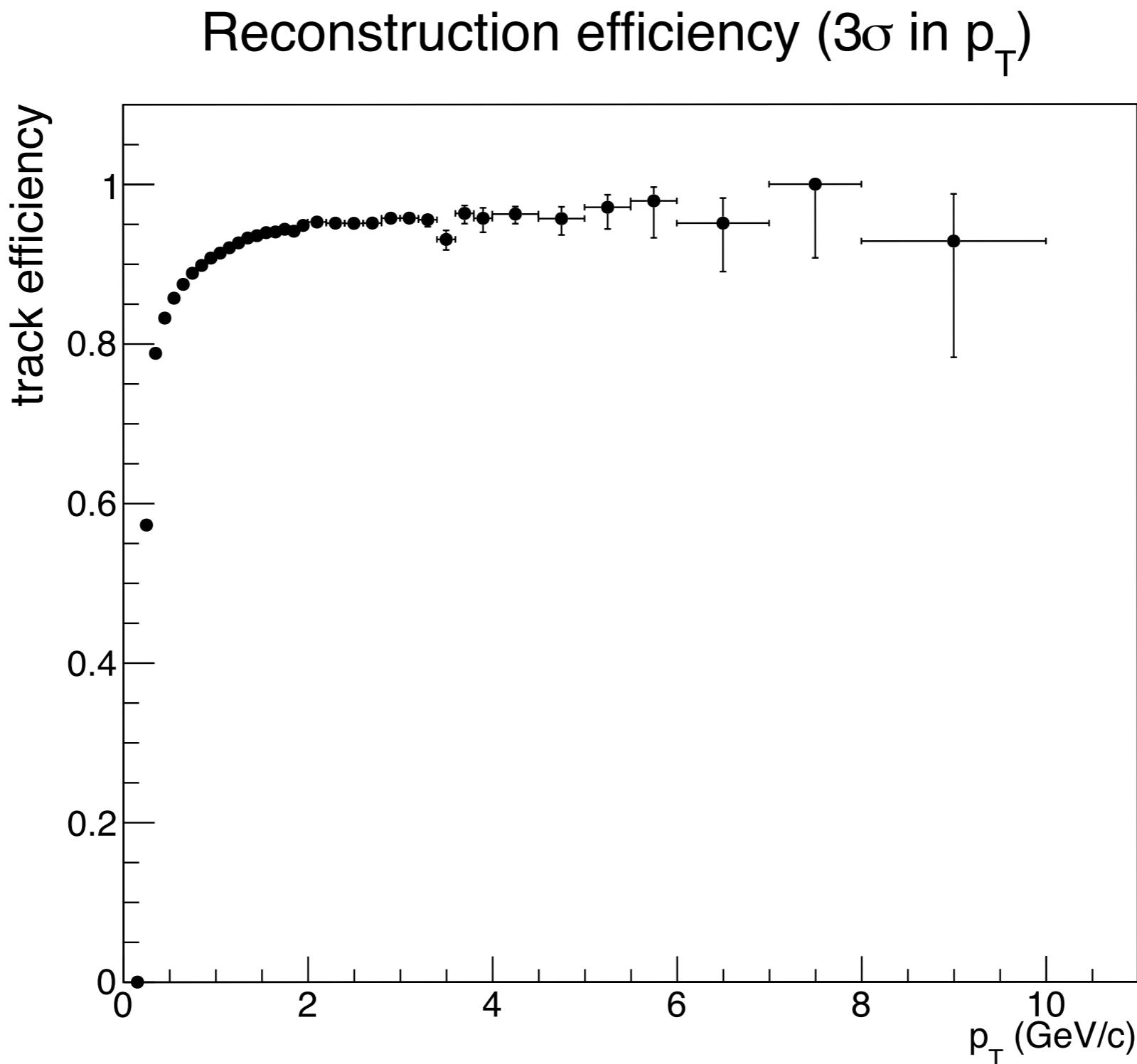
Momentum resolution for single pions



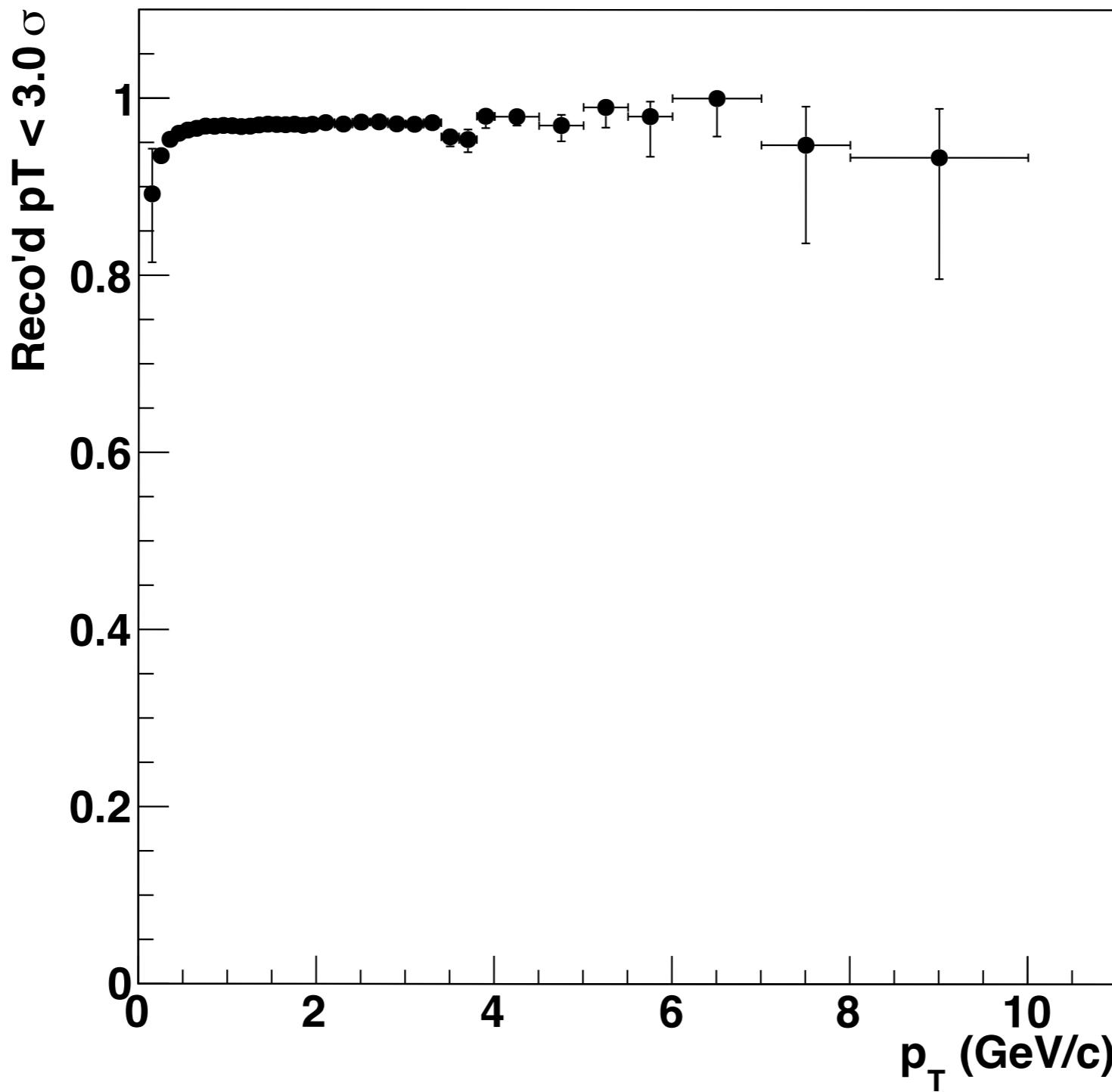
DCA resolution for embedded pions



Reconstruction efficiency - AuAu central Hijing events



Reconstructed tracks within 3σ of truth momentum



Upsilon mass spectrum p+p

$\Upsilon(1S,2S,3S) \rightarrow e^+e^-$

